



**PROPOSED UNDERGROUND STORAGE TANK (UST)  
RELEASE CASE CLOSURE EVALUATION SUMMARY**

**LUST Case File: # 0247. 02**  
**Facility ID # 0-001581**  
**Yuma County**

**Coca-Cola Bottling Company**  
**439 South Gila Street**  
**Yuma, Arizona 85364**

*Background:*

The former Coca-Cola Bottling Company (CCBC) Facility is located at 439 South Gila Street, Yuma, Arizona. The Site covers approximately 2 acres in an industrially zoned section of Yuma, Arizona. The project Site is located at 439 South Gila Street in Yuma, AZ. The Site has historically been situated in an industrial area and bounded on the north by the Riverbend Citrus/Tomato Processing Plant, on the west by a Union 76 (Unocal) Petroleum Service facility, on the south by a Union 76 (Unocal) Bulk Petroleum Storage facility, and on the east by the Southern Pacific Railroad (UPRR). The property was used as a refrigeration (ice production) facility from the 1930's through 1977. The CCBC operated a beverage bottling production and distribution facility from approximately 1977 to 1987. The Site is currently vacant, and no buildings are present.

CCBC removed two 1,000-gallon leaded gasoline underground storage tanks and associated product piping from the Site in June 1988. Hydrocarbon impacted soil was discovered at that time, and several phases of site assessment activities were subsequently performed to assess the extent of impact. Soil Samples were collected from beneath the ends of each tank immediately after removal from the excavation. Following the removal of the underground storage tanks (USTs), fourteen borings were completed, eleven of which were converted to monitoring wells, and additional monitoring wells MW-1, MW-3, MW-5, MW-7 thru MW-14 were installed.

Remediation began at the site in 1988, which is discussed in the next section of this document.

*Removal or control of the source of contamination:*

Following removal of the USTs in 1988, several remedial technologies have been implemented at the Site during the 30-year case history. A summary of past remedial activities is provided in the table below.

Activity	Soil (tons)	Fuel Product (gallons)	Vapor Mass (pounds)	ISCO (pounds)	ISCO (gallons)	Reference
1988 - 1989: Free Product Skimming	-	2,250		-	-	WTI, 1989
1989 - 1992: GW and Soil Vapor Extraction	-	-	NR	-	-	
1995 Excavation (SW Corner)	763	-	-	-	-	SEI, 2008
1995 - 1998: SVES (upgraded system)	-	-	56,773	-	-	SEI, 2002
1998: ORC Injections	-	-	-	-	55	SEI, 2004
2013: Bunker Fuel Excavations	2,086	-	-	-	-	CRA, 2013
2017: Soil Mixing (ISCO)	-	-	-	71,296*; 600**	2,550*; 1,380**	(Antea Group, 2018)
2017: Excavation (Former USTs)	183	-	-	-	-	(Antea Group, 2018)
2017/2018: ISCO Direct Injections	-	-	-	-	52,050	(Antea Group, 2018)
Estimated Totals	3,032	2,250	56,273	71,896	56,035	

Notes: NR – Reference not available; \* RegenOx® Part A; \*\* ORC®; \*Hydrogen Peroxide; \*\* RegenOx® Part B.

Antea Group implemented a data gap assessment that included the completion collection of subsurface water samples from the MIP boring locations MIP-3, MIP-5, MIP-7, MIP-9, MIP-10, and MIP-11 along with the collection of water samples from the monitoring well network. The performance monitoring program outlined in the Site Status Report dated May 10, 2018 identified five (5) pre-existing monitoring well locations that were used to gauge the effectiveness of the remedy, that included MW-1, MW-3, MW-5, MW-7 (reinstalled following the remedy implementation as MW-7A), and MW-21. Monitoring Well MW-7/7A is located within the soil mixing implementation area while the remaining four (4) monitoring wells are in the direct injection implementation area. The table below provides a summary of the laboratory results from water samples collected during the August 2017 sampling event which is the last sampling event prior to the implementation of the remedy.

Well Location	GRO	Benzene	Ethylbenzene
MW-1	8,420	1,000	1,070
MW-3	5,210	1,900	348
MW-5	3,870	69.6	339
MW-7	26,300	10,000	1,570
MW-21	<100	5.71	1.25

**Notes:**

Concentrations in µg/L

< - constituent detected in a concentration below LRL.

The following table provides a summary of the approximate percent changes in dissolved-phase concentrations in water samples collected from the performance monitoring well network.

Well Location	GRO	Benzene	Ethylbenzene
MW-1	Reduction of 99%	Reduction of 96%	Reduction of 96%
MW-3	Reduction of 11%	Reduction 24%	Reduction of 73%
MW-5	Reduction of 73%	Increase of 64%	Reduction of 66%
MW-7/7A	Reduction of 80%	Reduction of 94%	Reduction of 91%
MW-21	ND	Reduction of 82%	Reduction of 20%

**Notes:**

ND – Not detection above LRLs

*Characterization of the groundwater plume:*

The subsurface stratigraphy at the Site, as observed during assessment activities, generally consists of silt and clay to approximately 12 feet bgs; it is underlain by predominately sand with lenses of silt and clay from approximately 12 to 18 feet bgs, followed by silty sand to sand to the total depth explored. During site assessment activities, groundwater has been encountered at depths ranging from approximately 11 to 21 feet bgs; with the average depth to water in the former USTs area ranging approximately 14 feet to 15.5 feet bgs. The groundwater beneath the Site lies in the upper-most aquifer zone that includes younger alluvium and the uppermost deposits of older alluvium. Prior to development of the Yuma Basin, nearly all groundwater recharge was from the Colorado and Gila Rivers through direct channel infiltration and annual flooding. A significant source of groundwater recharge now comes from percolation of excess water applied to crops to reduce salt accumulation in the root-zone. The regional groundwater near the Site typically flows in the northwest direction within the shallow or upper aquifer zones. A hydrograph generated from past monitoring events suggests the subsurface water elevation generally increased in the early 1990s stabilizing for the most part between an elevation of 114 feet to 119 feet above mean sea level from the mid-1990s through 2019. The direction of groundwater movement beneath the Site has generally been reported toward northwest at an estimated gradient of 0.001 with some on-site localized mounding. Based on the field data collected in June 2019, the slope of the groundwater gradient at the southern edge of the property is estimated to be 0.01; decreasing at the northern edge of the Site to 0.001.

Groundwater monitoring actives were performed at eleven (11) monitoring wells in the second and third quarter 2020 on April 1 and 2, 2020, and July 1 and 2, 2020. As directed in the ADEQ letter dated March 4, 2020 the following monitoring wells are included in the 2020 groundwater monitoring program: MW-1, MW-3, MW-5, MW-7A, MW-15, MW-17, MW-26, MW-28, MW-29, MW-30, and MW-31. Historically, the subsurface water movement is consistent with the current reporting period as northwest.

A review of the laboratory results indicates that benzene was the only constituent detected in a concentration above the AWQS. The laboratory results for the water samples obtained in April 2020 indicate that benzene was reported with concentrations above the AWQS of 5 micrograms per liter ( $\mu\text{g/L}$ ) at monitoring well locations MW-1, MW-3, MW-5, MW-7A, MW-15, MW-26, and MW-29.

The laboratory results from water samples obtained in July remained consistent with the prior sampling event except for water samples collected from monitoring wells MW-15 and MW-31. The concentration of benzene was lower than the AWQS in the water sample collected from Monitoring Well MW-15 (below the LRL), while the sample obtained from Monitoring Well MW-31 ( $5.25 \mu\text{g/L}$ ) was slightly higher than the AWQS.

*Groundwater plume stability:*

To document the trends in dissolved-phase benzene and ethylbenzene at the Site, time series graphs were prepared for 12 monitoring wells covering the period from the early 1990s through the sampling event completed in April 2020. A review of the post-remedy concentration trends indicates an overall reduction in dissolved-phase concentrations.

The Mann-Kendall analysis was run using an applied Microsoft Excel spreadsheet developed by GSI Environmental ([www.gsi-net.com](http://www.gsi-net.com)). Of the following eleven (11) monitoring wells that were identified in the ADEQ letter, the Mann Kendall Trend Test results indicate that, except for Monitoring Well MW-26, the concentration trend for dissolved-phase benzene is either decreasing or stable. The Mann Kendall Trend Test results indicate an increasing concentration for water samples analyzed from Monitoring Well MW-26. This well location is situated up-gradient of the on-site source area on an off-site adjacent property owned by Union Pacific Rail Road.

#### *Natural Attenuation:*

Natural attenuation processes include diffusion, dispersion, sorption, volatilization, and biodegradation. A decreasing trend in VOC concentrations in groundwater has been established, which supports that natural attenuation is occurring. Hydrologic and geochemical data can be used to indirectly demonstrate the type(s) of natural attenuation processes.

Dissolved oxygen (DO) measures excess dissolved oxygen present in the groundwater that has not been used in the metabolism of COCs; it was measured ranging from 0.18 milligrams per liter (mg/L) (MW-7A) to 2.24 mg/L (MW-22), with an average of approximately 0.65 mg/L. Three monitoring wells were measured above 1 mg/L (MW-17, MW-18, MW-22, and MW-24).

Oxidation Reduction Potential (Redox) is an indicator of aerobic/anaerobic conditions. Redox was measured ranging from negative (-) 361.5 mV (MW-17, RW-2) to positive (+) 147.9 mV (MW-21, RW-1), with an average of (-) 168.66 mV across the Site. The lowest Redox measurements (near/below 300 mV) were generally measured within the benzene plume (MW-1, MW-3, MW-5, MW-7A, MW-15, MW-17, MW-26, and MW-29), with the highest readings outside the plume footprint (MW-11, MW-13, MW-21, MW-23, and MW-27A).

The pH in groundwater beneath the Site was measured ranging from slightly acidic to slightly above neutral (6.21 to 8.11). This is generally within the optimal range for microbial activity of 6.0 – 8.0 units.

The temperature (in Fahrenheit) in groundwater beneath the Site was measured from 83.48° to 94.46°. This is generally within the optimal range for microbial activity of 68° to 86° with 25 of 27 wells at or below 88°.

Antea Group utilized the BIOSCREEN Natural Attenuation Decision System (BIOSCREEN) developed by the USEPA to model COCs detected above the ADEQ Tier 1 AWQS for benzene (5 µg/L) and predict the extent of the hydrocarbon plume. Historically, the gradient at the Site has been recorded as north to northwest; for the purpose of this modeling, a northwest gradient was modeled. This model is based on the Domenico analytical solute transport model and can simulate advection, dispersion, adsorption, aerobic decay, as well as anaerobic reactions. The BIOSCREEN modeling indicates that benzene is undergoing biodegradation and the field data best fits the infinite mass scenario; the “1st Order Decay” curve presents a conservative estimate of the extent of the dissolved-phase benzene plume. Based on the calibrated models and “1st Order Decay” conditions, the BIOSCREEN modeling indicates that the maximum extent of the

benzene plume at the 5 µg/L action level is no greater than 115 feet northwest of the former USTs. Therefore, based on the variable gradient at the Site, a maximum extent of 115 feet for the benzene plume from the former USTs is used for subsequent comparison with potential receptors. The model results are consistent with groundwater analytical data, benzene concentrations in down-gradient monitoring wells MW-22, MW-18, and MW-13 have been reported below the action level since 2003, 2007, and 2010, respectively.

*Threatened or impacted drinking water wells:*

The Arizona Department of Water Resources (ADWR) Well Registry was used to review domestic and municipal drinking water wells located within a 1/2-mile radius of the Site; they are listed as “exempt” and “non-exempt” wells within the database. No drinking water wells were identified within 1/2-mile of the Site; one non-exempt well is registered at the Site (Registration number: 524283), which has been identified as existing well MW-15/RW-5.

The primary water supply (approximately 85%) for the City of Yuma is the Colorado River. The remaining 15% is a seasonal blend of groundwater from three wells located at the Agua Viva Water Treatment Facility located approximately 8 miles to the southeast of the Site.

ADEQ reviewed the ADWR Well Registry and identified 199 total registered wells within 1/2 mile of the Site. The remaining 198 wells are registered as monitoring or other.

According to ADWR, any new or replacement well located at or near this LUST site would need to meet the criteria of A.A.C. R12-15-1302 (B) (3).

*Other exposure pathways:*

Soil samples collected between 5 and 15 feet had no VOC contamination present over an applicable regulatory standard, so dermal contact and ingestion are not complete exposure pathways.

Historic soil contamination was present over applicable regulatory standards. On September 10, 2019, soil vapor probes (SVP-1 through SVP-6) were installed. Each boring was advanced to an approximate depth of 5.5-feet bgs using a three-and-a-half-inch diameter hand auger. A soil sample was obtained from each location collected at five (5) feet bgs. The samples were screened for volatile organic compounds (VOCs) using a field photo-ionization detector (PID) calibrated to 100 parts per million (ppm) isobutylene and observation of soil characteristics. Soil vapor probes were installed in each boring. Antea Group then conducted soil vapor sampling activities at each probe location on September 20, 2019, following a minimum of 48 hours after installation to allow the soil vapor probes to equilibrate with subsurface conditions. Prior to soil vapor sample collection, a purge test was conducted at one probe location (SVP-5) to determine the appropriate purge volume for subsequent vapor sampling locations.

Soil vapor samples were analyzed for the presence of gasoline range organics (GRO) and VOCs by Method TO-15 and for fixed gases (oxygen, carbon dioxide, carbon monoxide, and methane), by Method D1946. Tier 3 screening limits were calculated from United States Environmental Protection Agency (USEPA) Region 9 Regional Screening Levels (RSLs). None of the ADEQ

Tier 1 petroleum compounds detected above laboratory reporting limits were in concentrations above the estimated Tier 3 limits. Since the ADEQ Risk Based Corrective Action Tier 3 Checklist for Soil Gas Surveys suggests that COCs be modeled using the Johnson & Ettinger (J&E) Model when a given COC exceeds 1/10<sup>th</sup> of the USEPA RSL for the residential exposure scenario, the J&E Model was not performed/required for purposes of the closure request report.

Antea obtained an Environmental Data Resources (EDR) report within 1 mile of the Site. Three parks are located within a half mile from the Site. Yuma Armed forces park is approximately 0.35 miles to the north of the Site (cross gradient), a park associated with the Heritage Library was identified approximately 0.5 miles to the west-northwest of the Site (down gradient), and Riverside Park located approximately 0.5 miles to the north-northeast of the Site (cross gradient).

The subsurface soil contamination has not migrated off-site, so it has not impacted these off-site receptors. The groundwater contamination has also not migrated this distance off-site.

The nearest surface body of water is the Colorado River; at its closest it is located approximately 0.4 miles north-northeast of the Site. The Colorado River is located on the east side of Interstate 8, whereas the Site is located west of Interstate 8. The Site is not located within the floodplain of the Colorado River.

*Requirements of A.R.S. §49-1005(D) and (E):*

The results of the corrective action completed at the site assure protection of public health, welfare and the environment, to the extent practicable, the clean-up activities completed at this site allow for the maximum beneficial use of the site, while being reasonable, necessary and cost effective.

*Other information that is pertinent to the LUST case closure approval:*

The facility and LUST files were reviewed for information regarding prior cleanup activities, prior site uses and operational history of the UST system prior to removal.

Groundwater data summary tables:  
(No individual data tables due to the extensive well network at the site)

**Summary of COC Detections above LRL – July 2020 Sampling Event**

Constituents	Number of Samples Above LRL of the Samples Collected	Minimum Reported Concentration, in µg/L (Well ID)	Maximum Reported Concentration, in µg/L (Well ID)
Benzene	7	4.21 (MW-5)	487 (MW-29)
Toluene	4	1.08 (MW-7A)	20.1 (MW-29)
Ethylbenzene	6	4.02 (MW-7A)	637 (MW-29)
Total Xylenes	5	3.27 (MW-3)	164 (MW-29)
MTBE	5	1.31 (MW-3)	4.79 (MW-31)
1,2-DCA	0	ND	ND



### Summary of Past Verses Current Dissolved-Phase Benzene Concentration

Well Location	Well Location Relative to Treatment Area	Maximum Concentration Report (micrograms per liter)	Minimum Concentration Report (micrograms per liter)	Most Recent Benzene Concentration Report (micrograms per liter)	Estimated Change in Concentration from Maximum	Number of Monitoring Events	Date Range of Monitoring Events
MW-1	On-Site, Northern edge of Zone 2 Treatment Area	8,200	102	166	98%	43	6/8/1993 thru 7/1/2020
MW-3	On-Site, Southern edge of Zone 2 Treatment Area	3,300	0.14	359	89%	36	6/8/1993 thru 7/3/2020
MW-5	On-Site, Outside of the Treatment Areas, near northeast portion of the property	3,300	4.21	4.21	100%	42	6/8/1993 thru 7/1/2020
MW-7/MW-7A	On-Site, Centrally located within the Zone 1 Treatment Area	13,000	258	258	98%	33	6/8/1993 thru 7/1/2020
MW-9	On-Site, Southern property line	6.6	ND	<1.00	100%	30	4/6/1990 thru 12/19/2019
MW-10	On-Site, Southern property line	2.23	ND	<1.00	100%	30	4/6/1990 thru 6/26/2019
MW-11	Off-Site to the southwest	1.7	ND	<1.00	100%	31	4/6/1990 thru 6/25/2019
MW-12	Off-Site to the west	9,100	ND	<1.00	100%	22	4/6/1990 thru 6/25/2019
MW-13	Off-Site to the west	8,700	ND	<1.00	100%	50	4/6/1990 thru 6/25/2019
MW-14	On-Site and up-gradient to the south of the Treatment Area	1,400	ND	<1.00	100%	31	4/6/1990 thru 6/26/2019
MW-15 (RW-5)	On-Site, Northern edge of Zone 2 Treatment Area	1,500	ND	<1.00	100%	26	2/28/1991 thru 7/1/2020
MW-16	On-Site and up-gradient to the south of the Treatment Area	4,220	ND	<1.00	100%	44	6/21/1990 thru 6/26/2019
MW-17 (RW-2)	Off-Site to the west of the Treatment Area	3,600	ND	<1.00	100%	41	2/28/1991 thru 7/2/2020
MW-18 (RW-4)	Off-Site immediately northwest of Zone 2 Treatment Area	16,000	ND	<1.00	100%	32	12/13/1990 thru 6/25/2019
MW-19	On-Site and up-gradient to southwest of the Treatment Area	31	ND	<1.00	100%	27	12/13/1990 thru 6/26/2019
MW-20	On-Site and up-gradient to the south of the Treatment Area	1500	ND	<1.00	100%	32	12/13/1990 thru 6/26/2019
MW-21 (RW-1)	On-Site and up-gradient of the southern edge of Zone 2 Treatment Area	2,000	ND	<1.00	100%	30	12/13/1990 thru 6/26/2019
MW-22 (RW-3)	Off-Site to the west of the Treatment Area	28,000	ND	<1.00	100%	29	6/27/1991 thru 6/25/2019
MW-23	Off-Site to the northwest	18	ND	<1.00	100%	26	6/27/1991 thru 6/25/2019
MW-24	Off-Site to the west	ND	ND	<5.00	NA	20	6/27/1991 thru 6/25/2019
MW-25	Off-Site to the west	ND	ND	<1.00	NA	20	6/27/1991 thru 6/25/2019
MW-26	Off-Site to the southeast of the Treatment Area	1,800	1.73	348	81%	34	6/19/1995 thru 7/1/2020
MW-27A	Off-Site to the east of the Treatment Area	848	2.50	<1.00	100%	18	10/17/2012 thru 6/25/2019
MW-28	Off-Site, Located on the adjacent property to the north of the project site	15	ND	<1.00	100%	33	1/20/1995 thru 7/2/2020
MW-29	On-Site, Located on the border of the Zone 1 and Zone 2 Treatment Area near the western side of the property	487	18.9	487	0%	10	2/28/2018 thru 7/1/2020
MW-30	On-Site, Located on the border of the Zone 1 and Zone 2 Treatment Area near the western side of the property	79.1	ND	<1.00	100%	10	2/26/2018 thru 7/1/2020
MW-31	On-Site, Northern portion of Zone 2 Treatment Area	436	2.3	5.25	99%	10	2/26/2018 thru 7/1/2020
27	On-Site Averages:	2,630.80	64.26	213.24	92%		
	Off-Site Averages:	6,808.27	2.12	348.00	98%		
	Project Wide Averages:	4,301.79	48.72	232.49	95%		

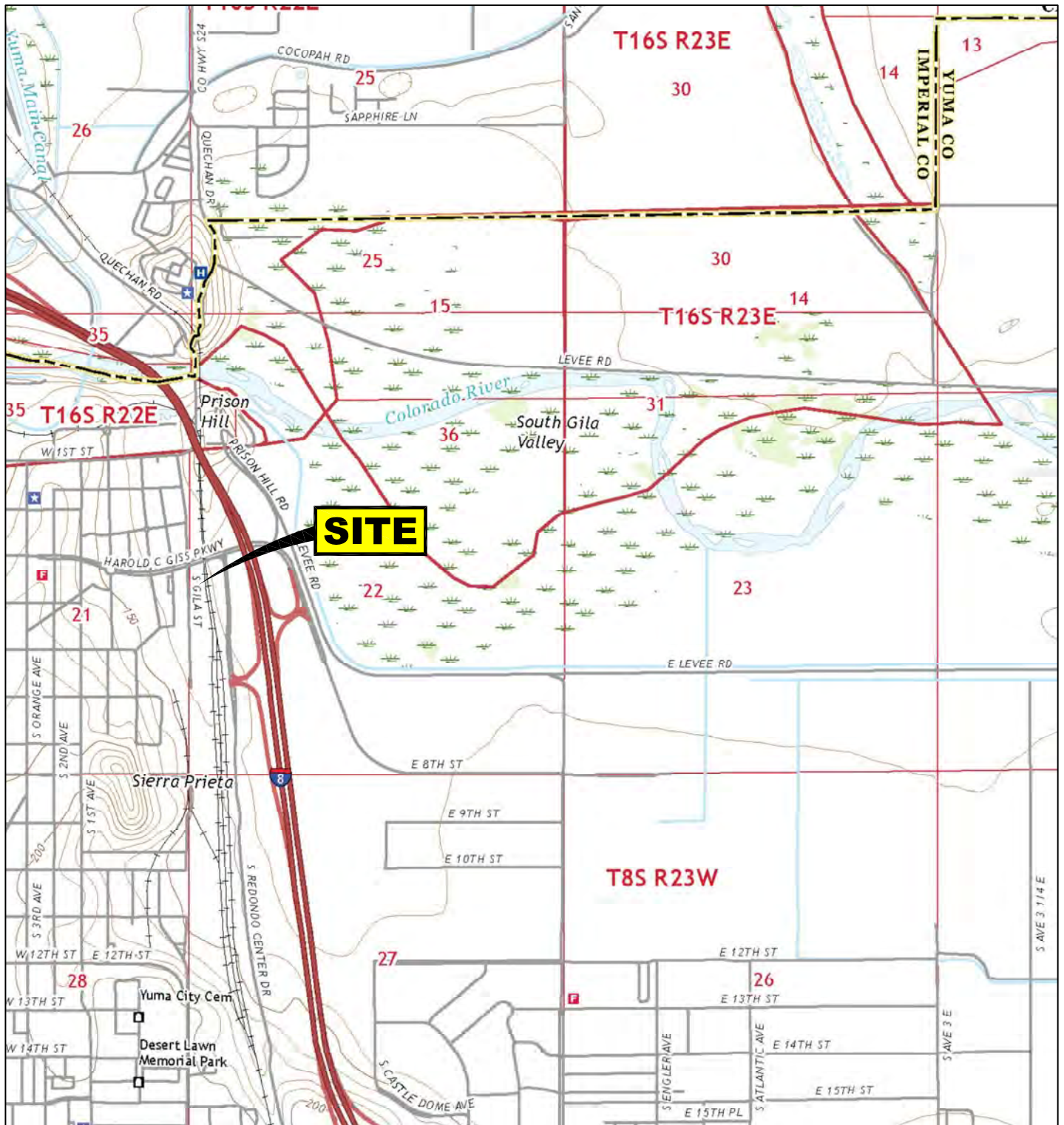
**Notes:**

< - Not detected at the indicated laboratory reporting limit

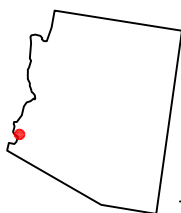
ND - Not detected at a concentration at or above the laboratory reporting limit

Well not located on-site

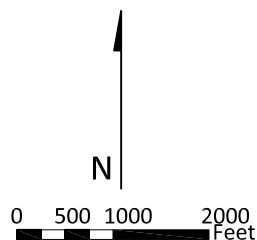
Well located at the up-gradient periphery of the property



SOURCE: USGS US TOPO 7.5 MINUTE QUADRANGLE  
YUMA EAST, AZ, CA 2018



ARIZONA



**FIGURE 1**  
**SITE LOCATION MAP**

COCA-COLA BOTTLING COMPANY  
439 SOUTH GILA STREET  
YUMA, ARIZONA

PROJECT NO.:	33CCR16790	DRAWN BY:	KYM/JLH
PREPARED BY:	JF	DATE:	2/07/2020
REVIEWED BY:	CJ	FILE NAME:	YUMA_TOPO.DWG

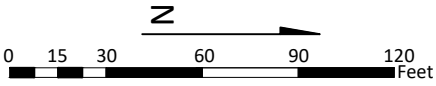






**LEGEND**

- MW-1 GROUNDWATER MONITORING WELL LOCATION
- MW-7 ABANDONED GROUNDWATER MONITORING WELL LOCATION
- AS-01 VAPOR EXTRACTION WELL LOCATION
- MIP-1 MEMBRANE INTERFACE PROBE LOCATION
- 1A TANK CLOSURE SAMPLE
- CB-1 CONFIRMATION BORING SAMPLE
- #2 BORING LOCATION
- UNION PACIFIC RAILROAD BUNKER C FUEL EXCAVATION (VARIABLE DEPTHS 3-11.5' BGS)



NOTE: MAP MODIFIED FROM SURVEYOR'S BASE MAP  
(CAL VADA SURVEYING CO., CORONA, CA.)

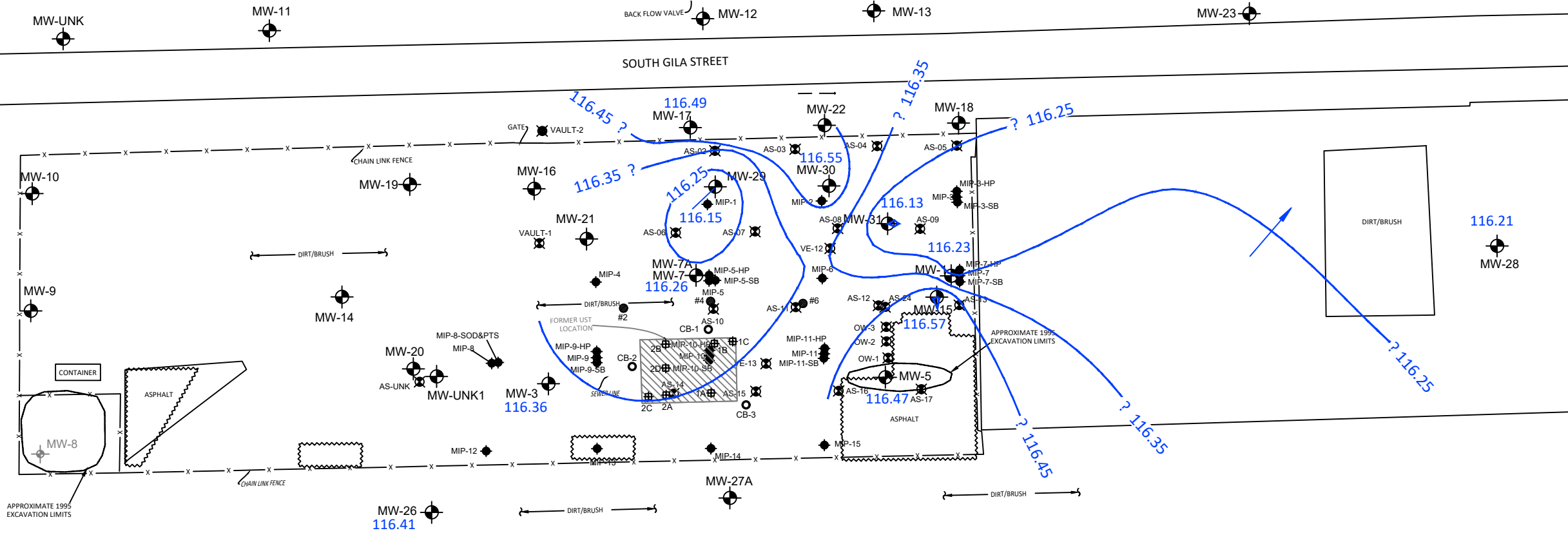
**FIGURE 2**  
**SITE MAP**

COCA-COLA BOTTLING COMPANY  
439 SOUTH GILA STREET  
YUMA, ARIZONA

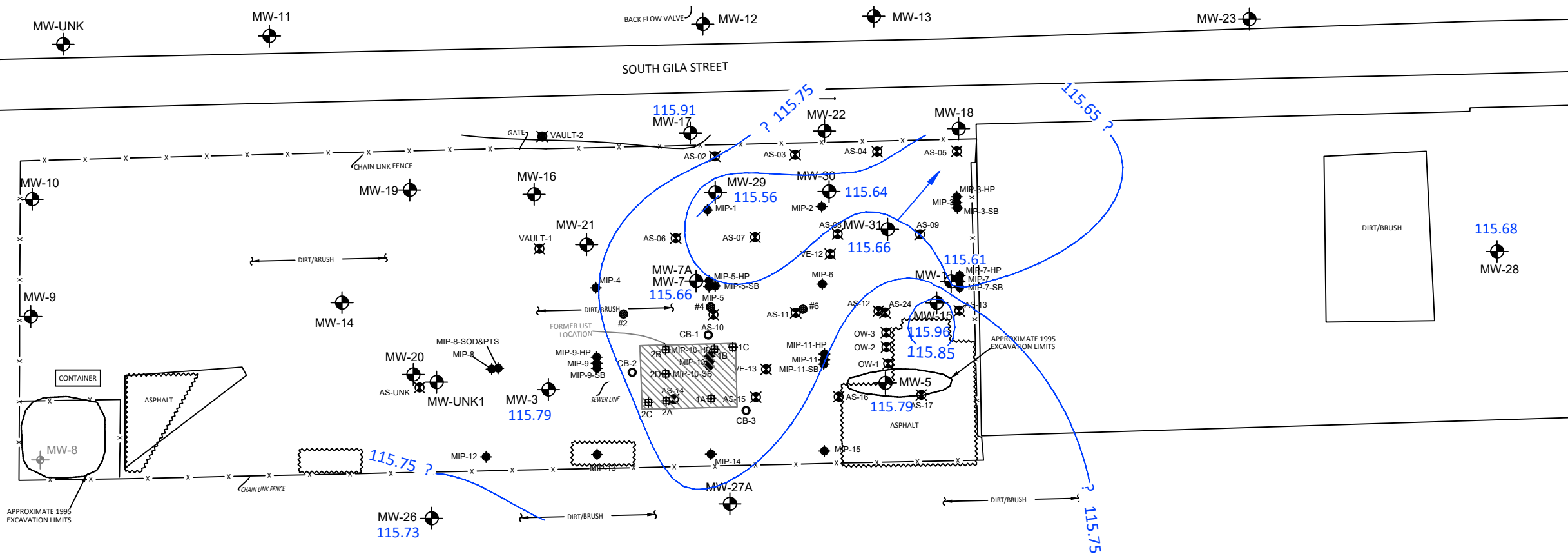
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PREPARED BY: NA	DATE: 11/11/2019
REVIEWED BY: CJ	FILE NAME: YUMA_AZ_2019.DWG



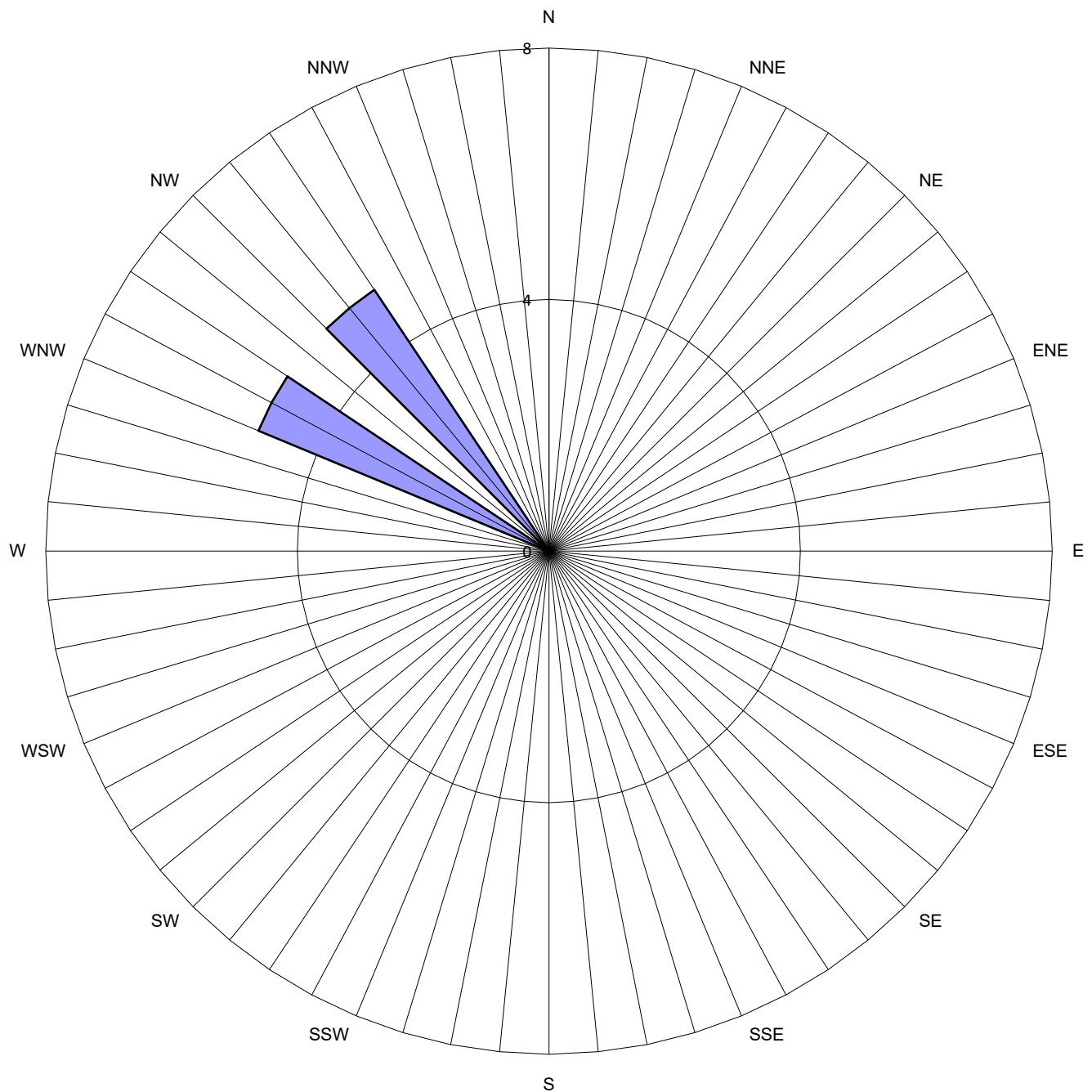
APRIL 1-2, 2020



JULY 1, 2020



**FIGURE 4**  
**SUBSURFACE WATER FLOW DIRECTION ROSE DIAGRAM**  
**FORMER COCA-COLA BOTTLING FACILITY**  
**439 SOUTH GILA STREET,**  
**YUMA, ARIZONA**

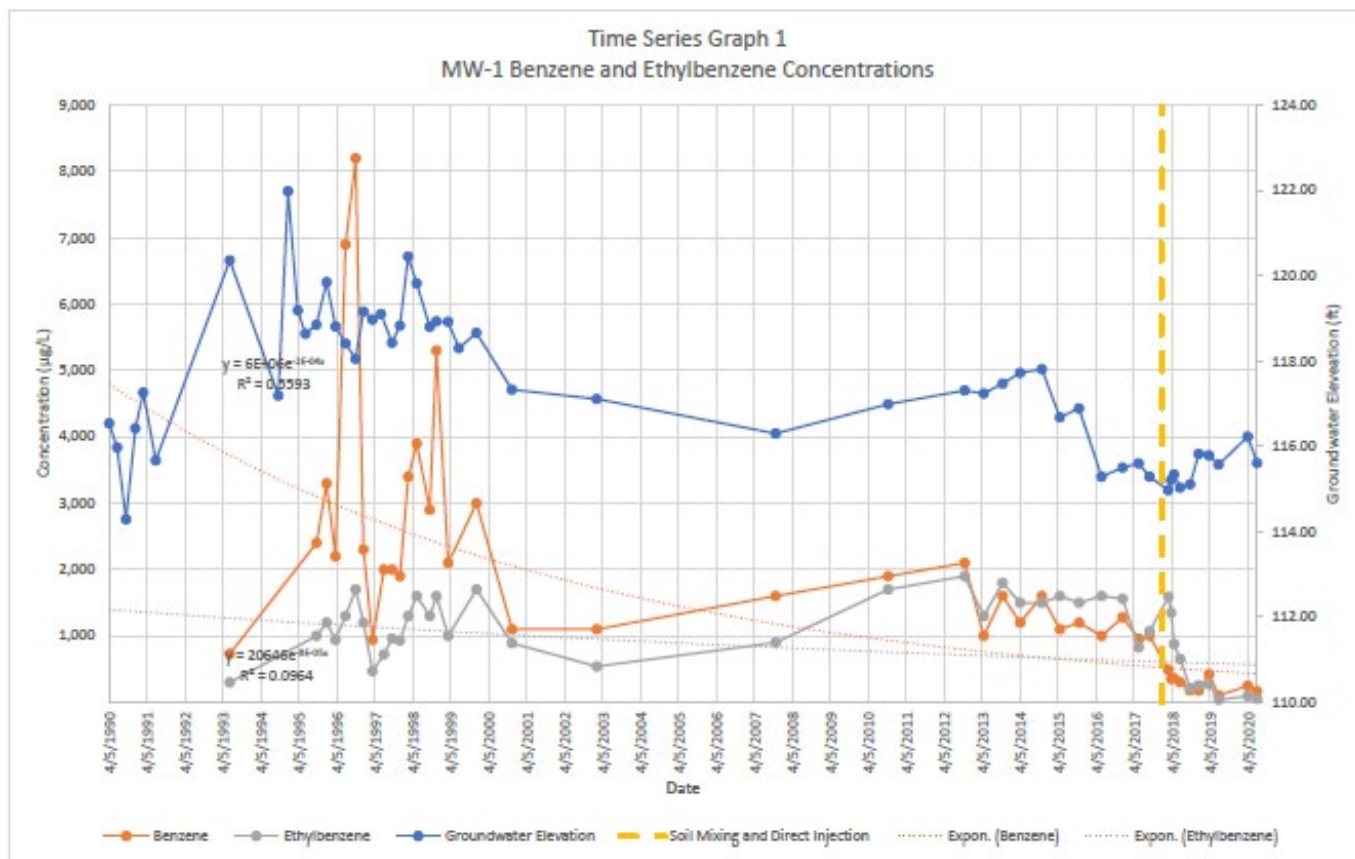


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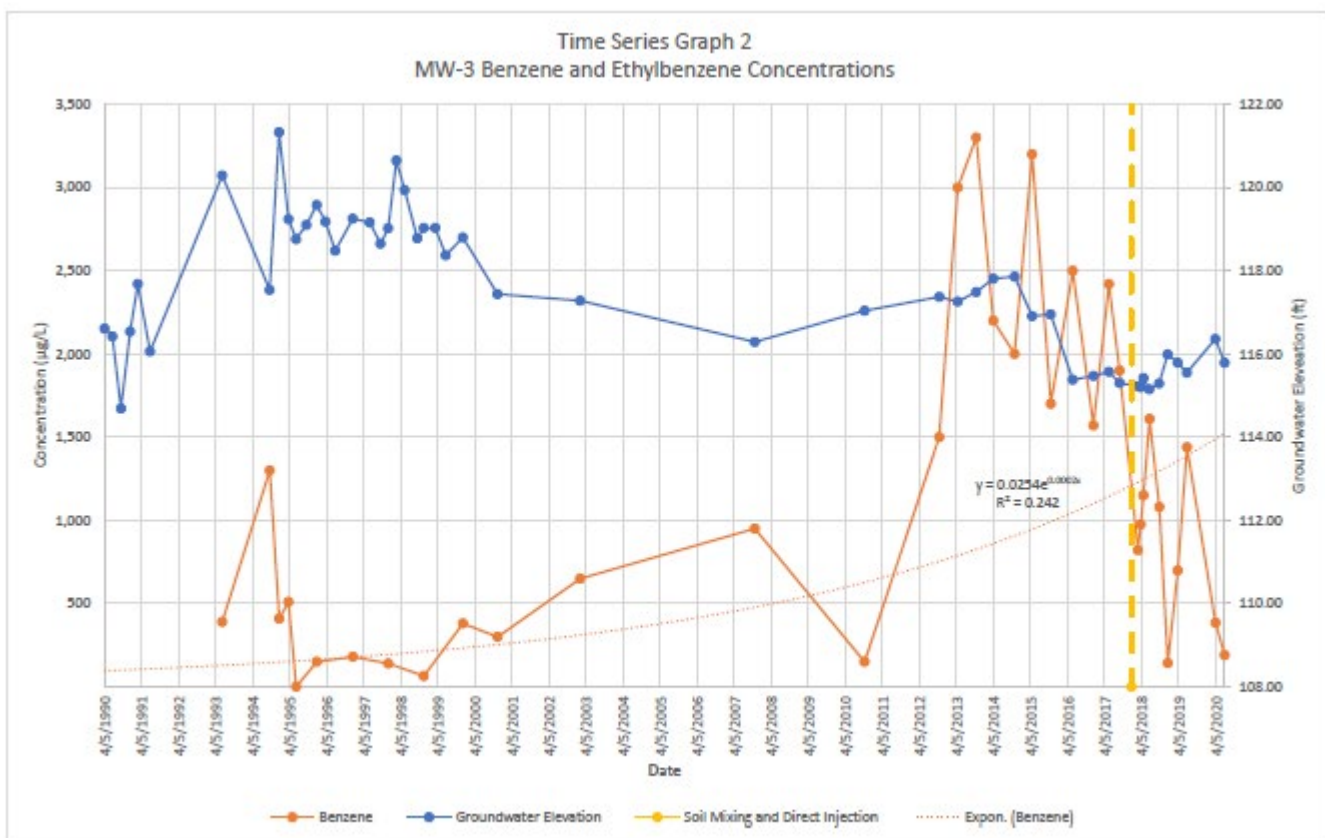
Concentric Circles represent  
**10** Monitoring Events  
conducted between the 4th Quarter  
2016 through the 3rd Quarter 2020

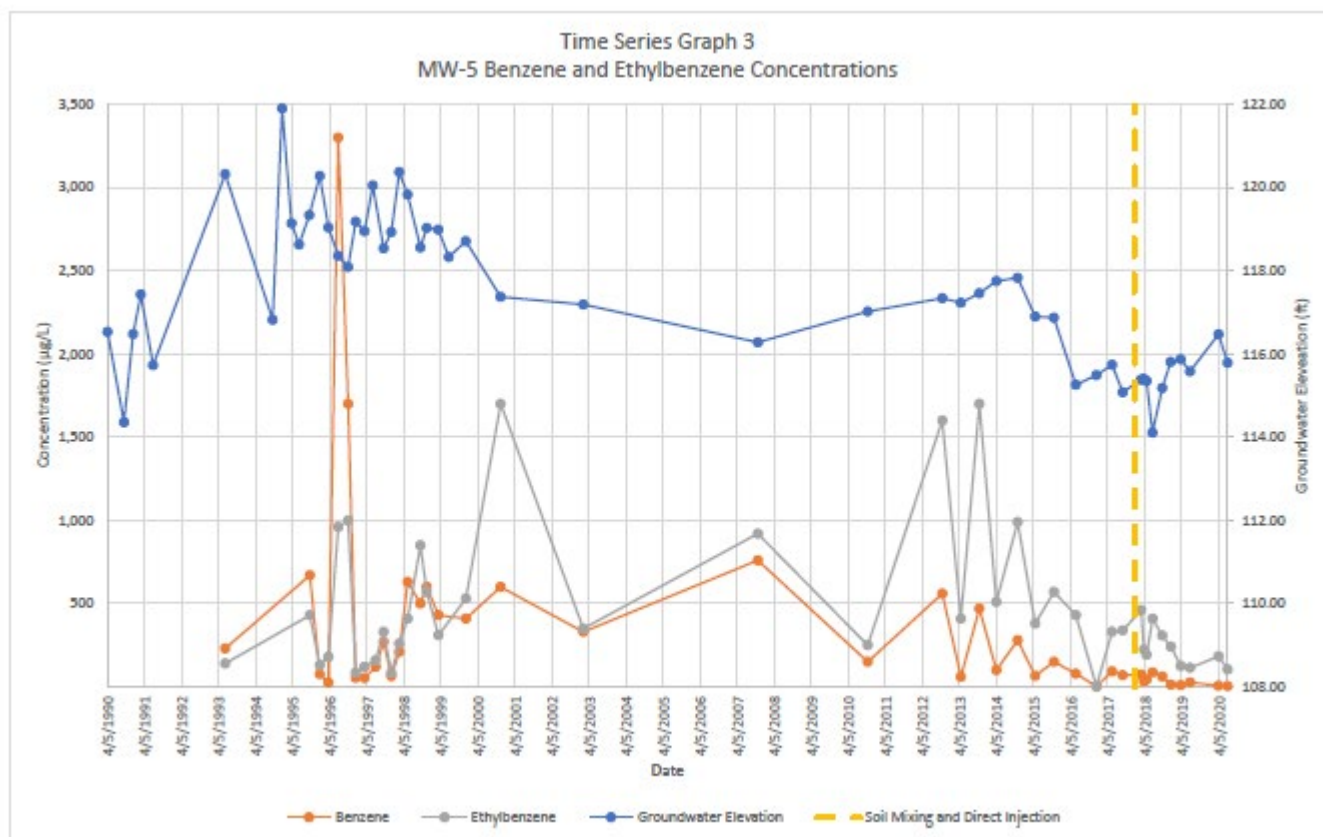
■ Groundwater Flow Direction

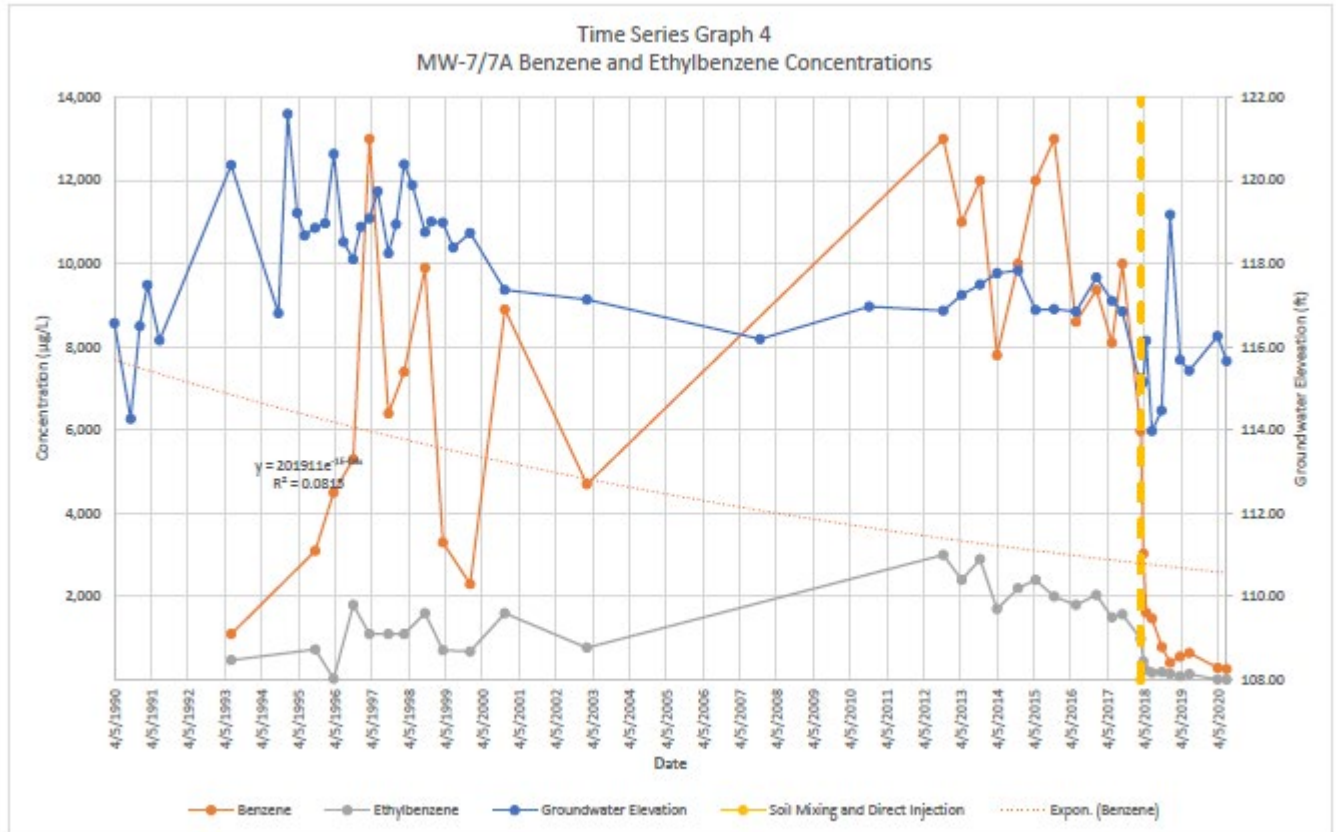




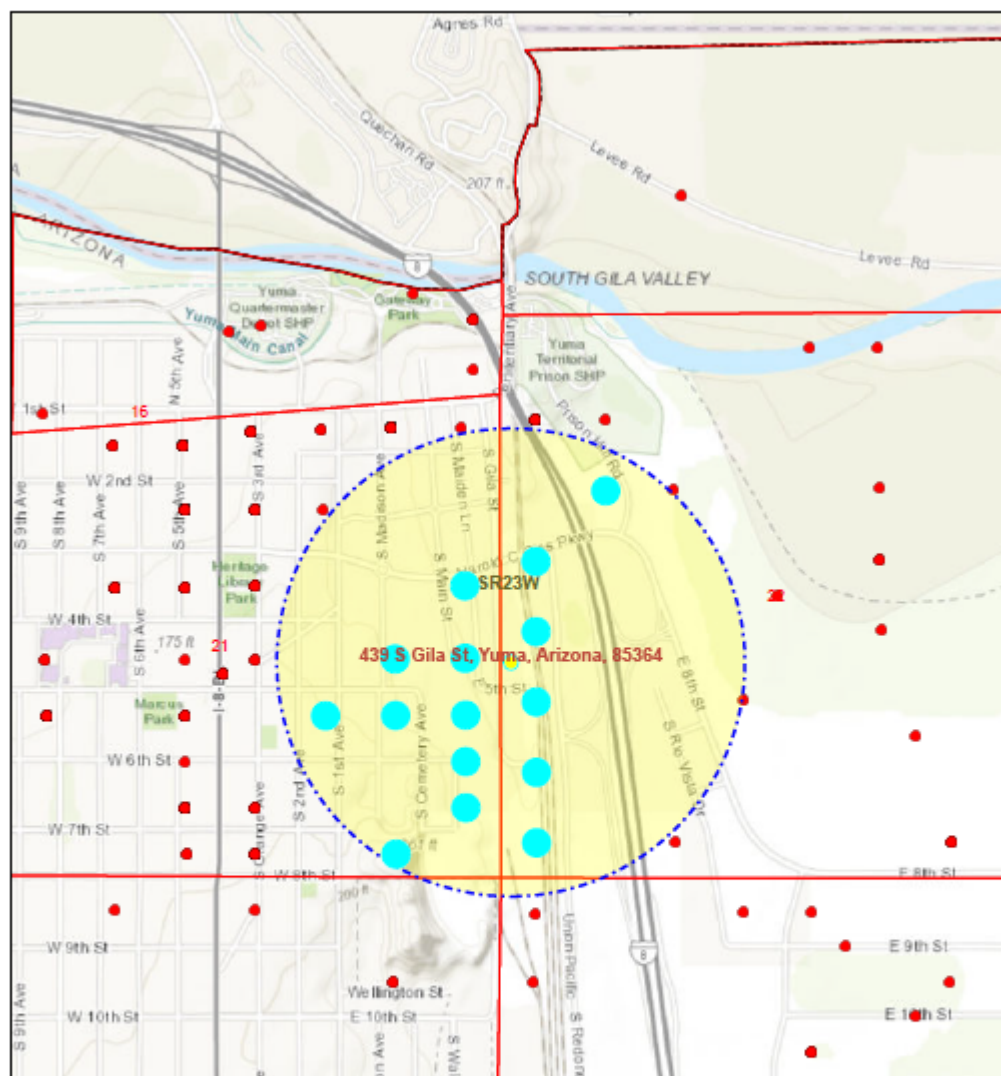






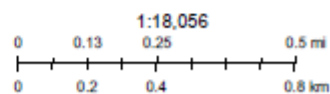


## Coca Cola Bottling



September 29, 2020

- Well Registry
- Section
- Township
- County



Sources: Esri, HERE, Garmin, Intermap, increment P. Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeBCo, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Arizona Department of Water Resources